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# THE GENUS EVERNIA AS REPRESENTED IN NORTH AND MIDDLE AMERICA

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(WITH PLATES XXIV AND XXV)

*Genus*: EVERNIA Ach. Lich. Univ. 84 et 441. 1810

The species of the genus, since 1753, have appeared under the following: *Lichen* L. (1793), *Lichenoides* Hoffm. (1790), *Lobaria* Hoffm. (1795), *Usnea* Hoffm. (1795), *Parmelia* Ach. (1810), *Borrera* Ach. (1810), *Physcia* DC. (1815), *Cornicularia* DC. (1815), *Ramalina* Chev. (1826), *Archevernia* Th. Fr. (1831), *Letharia* Th. Fr. (1831), *Phacopsis* Tul. (1852), *Chlorea* Nyl. (1859), *Rhytidocaulon* Nyl. (1859), *Alectoria* Mudd (1861), *Nylanderaria* Kuntze (1891); comparatively few of these, however, are generic synonyms.

DESCRIPTION: *Apothecia* subterminal, marginal or lateral; scutelliform, appanate or concave, sometimes convex and lacerate; marginate (thalloid dilations=*vulpina*); thalline exciple *rugose*; disk chestnut. *Asci* clavate, containing eight spores; paraphyses gelatino-filamentous. *Spores* monoblast, hyaline, ellipsoid. *Spermatogones* immersed, black. *Sterigmata* branched, articulate. *Spermatia* acicular, incrassate near apices.

*Thallus* caespitose, subpendulous or pendulous, branched; cortex *rugose*, sometimes perforate, smooth, furfuraceous or isidioid, subterete (subradial), compressed (bifacial) or angulate; rhizinae rarely present; sulphur yellow, stramineous, virescent-stramineous, or cinereous; *medulla* cottonous, arachnoid, or somewhat coalescent. *Gonidia*, *Protococcus* (*Cystococcus humicola* Naeg.). *Soredia* normal. *Cephalodia* small, often warty, concolorous, sea-green or black, often gelatinous.

OBSERVATIONS: After all has been said, I can see no sufficient reason for separating the genus as given by TUCKERMAN. That the species here considered all have *cottonous* arachnoid medullas, whether more or less coalescent, cannot be questioned, and in none of the species does a true *chondroid*, axial cord exist. This slight variation in the condition of the medulla (one more or less of growth) does not in the least justify generic separation. It is true, as TUCKERMAN pointed out, that thalline differences must always constitute our criteria for generic distinction in this most difficult group of plants; yet if

thalline differences are recognized beyond a certain plausible degree, it is hardly exaggerating to say we shall have eventually nearly as many genera as species. In fact in the present genus this is now almost true. In true *Evernia prunastri*, the type of the genus, a bifacial structure of the laciniae is evident. This condition becomes obscure in the variety *thamnodes*, and in *vulpina* it is nearly radial. In *divaricata* the bifacial structure is about as in *thamnodes*, while in *Trulla* and true *furfuracea* it is markedly bifacial (*parmelioid*), but in the latter's varieties (apical portions) *ceratea* and *cladonia* the radial structure is again approached. If a careful study of the thalline structure of the species here considered is made, it will be seen that the pendulous, prostrate condition of growth typical of this genus tends to destroy a complete radial development. A portion of some of the branches of almost every individual plant shows a bifacial structure, owing to the gonidia seeking the uppermost or light-exposed side. In the truly pendulous *Usneas* and *Alectorias*, and wide branching, rigid, non-prostrate *Ramalinas*, and in the rigid cespitose species of the two former genera, the complete exposure develops a truly radial structure. In the present genus, it is not strange therefore that we find the luxuriant and more rigid examples of *vulpina* and the longest pendulous specimens of *divaricata* most nearly approaching the radial condition. In other words, so far as the sectional structure of the laciniae is concerned, *Evernia* holds an intermediate position between the strictly radial *Usneae* and *Alectoriae*, and the bifacial *Parmeliacei*.

The rare tropical lichen *Evernia Trulla* (Ach.) Mont. was set apart by NYLANDER in a unique genus, *Everniopsis*. I have been able to study but one specimen of this plant, kindly loaned me by the National Museum, and the scarcity of material thus precludes a sufficient study to settle satisfactorily the question of its classification in my own mind. There is no question that the plant morphologically is nearest to *furfuracea*, as TUCKERMAN pointed out, and its bifacial and membranaceous thallus can hardly be said to have a chondroid axis, in fact a compressed stuppeous condition is all that appears to me evident.

The striking similarity between the corniculate smooth *Evernia furfuracea* var. *ceratea* (Ach.) Nyl. from the highest alpine zone, and *Parmelia physodes* var. *vittata* Ach. is undebatable, and extends somewhat further than a mere superficial resemblance. In fact, the points of differentiation are hardly traceable, lying for the most part in the inflated laciniae, and ecanaliculate condition of the thallus. This striking similarity attracted the attention of NYLANDER and CROMBIE, and was perhaps the cause of the glossarial adjective "evernioid."<sup>1</sup> There is every reason to hold this genus in close proximity to *Parmelia*.<sup>2</sup> *Evernia* (? *Alectoria*, *Letharia*) *canariensis* (Ach.) Nyl. shows also

<sup>1</sup> NYLANDER, *Flora* 52:445-446. 1869.

<sup>2</sup> *Parmelia Camtschadalis* var. *americana* (Mey. et Flot.) Nyl., except for its rhizinae, strongly resembles this variety, a canaliculate condition being here present.

its close relation to *Alectoria*, as *Evernia trulla* (Ach.) Mont. likewise suggests a *Cetrarian* relationship, through *Platysma everniellum* Nyl., etc. Dr. ZAHLBRUCKNER has placed *furfuracea* with the *Parmelias*, but has left *prunastri* with this genus. To me this seems inconsistent, as both are structurally bifacial,<sup>3</sup> though the former rarely shows a few rhizinae. He has also included *divaricata* under his *Letharia*, separating it thus generically from *prunastri*.

From the foregoing observations it is evident that this complex genus presents a transitional thalline condition, which though undeserving separation, as already pointed out, will be made more clear perhaps, if three sectional distinctions are indicated in our nomenclature. This was done in part by TH. FRIES in 1871.

Section: LETHARIA Th. Fr. Lich. Scand. 32. 1871

*Thallus subradial, medulla cottonous, coalescent into axial strands*

#### EVERNIA VULPINA (L.) Ach.

TYPE: Not indicated; the specimen on which LINNAEUS based his species is in the Dillenian herbarium, Botanic Gardens, Oxford, England, and according to CROMBIE and earlier writers is "*Physcia flavicans* (Sw.)" = *T[h]eloschistes chrysophthalmus* var. *flavicans* (Ach.) Tuck. All the pre-Linnaean botanists referred to the same Dillenian plate and specimen, and were followed by LINNAEUS. VILLARS in 1789, however, described diagnostically the true *Evernia* from Briançon, France, basing his species on HALLEY, who questioned his own reference to the Dillenian plate. SOWERBY, E. FRIES, and other authors previous to 1831 were aware of the Linnaean misconception. FRIES, however, followed ACHARIUS, as have all since, saluting the *Evernia* by the name *vulpina*. As the "Ulf-Mossa," however, according to NYLANDER, is a common plant in Scandinavia, and *flavicans* not only is not listed but is an austral species, it seems probable that LINNAEUS gave the name to the proper plant, and his reference to the *Teloschistes* was an error. WAINIO also states that in the Linnaean herbarium "78 *Lichen vulpinus* = *Evernia vulpina* Ach."<sup>4</sup> The substrate given for *vulpina* by LINNAEUS is certainly more characteristic of the *Evernia* than of *flavicans*, i.e., "tectis, ligneis, muris." The name *vulpina* has stood now for nearly two centuries, and on account of the Linnaean error it would seem inadvisable to drop it for *aurata* of VILLARS,<sup>5</sup>

<sup>3</sup> "*Facie dissimilis*," HUE, Nouv. Arch. Hist. Nat. 8:(4) 119. 1899; "dorsiventral," ZAHLBRUCKNER, Nat. Pflanz. 217. 1907.

<sup>4</sup> Meddel. Soc. pro Fauna et Flora fennica 14:10. 1886.

<sup>5</sup> Professor MIRANDE, Université de Grenoble in litt. states that VILLARS' type is not now in the remains of his herbarium in the Museum of the Ville de Grenoble; see NYLANDER, Bull. Bot. Soc. France 10:954. 1863.

the next available name; the type of which, according to NYLANDER, was in existence in 1863; according to Professor MIRANDE, under date of February 8, 1910, is not now to be found at Grenoble.

TYPE LOCALITY: "Europae."

ORIGINAL DESCRIPTION: "filamentosus ramosissimus erectus fastigiatus inaequali-angulosus."

FIGURE: SCHNEIDER, Guide to Lich., 2 ed. *pl.* 4. 1904.

SYNONYMY: *Lichen vulpinus* Linn. Spec. Pl. 2:1155. 1753; *Evernia vulpina* Ach. Lich. Univ. 443. 1810.

DIAGNOSIS: *Thallus* loosely caespitose, subterete, rugose, sulphur-yellow.

DESCRIPTION: typical. *Thallus* loosely caespitose, subterete to compressed (rarely pendulous), rigid; cortex rugose-lacunose, rarely perforate, sometimes proximally expanded and glabrous; virescent to sulphur-yellow; *primary branches* coarse, dichotomous, divaricate (max. length 15 cm.); *secondary branches* dichotomous, divaricate and attenuate. *Apothecia* subterminal, ample (max. diameter 2.6 cm.), appendiculate, thalline exciple rugose and expanding, disk chestnut, emarginate and ciliate. *Spores* 5-8.5  $\times$  4.5-5.5  $\mu$ .

CONTINGENT PHASES: (a) thallus spotted with minute black dots (spermogones), finally largely blackening; (b) reduced, sterile and virescent; (c) yellow sorediate (*E. v.  $\gamma$  incompta* Ach. Lich. Univ. 444. 1810).

SUBSTRATA: Trees, fences, and occasionally on rocks (limestone).

GEOGRAPHICAL DISTRIBUTION: Common in the lower Boreal zone, reaching rarely the Transition. The species extends from the mountains of Lower California, 8500 ft. (*Hasse*), and Mexico, Orizaba Mt., 9000 ft. (*Stone*), northward to British Columbia (*Macoun*, *Herden*) and Alberta (*Macoun* and others). It occurs up to 10,000 ft. in the Rocky Mountains. Though not included in Miss G. E. COOLEY's list of "Plants collected in Alaska and Nanaimo, B.C.," etc., nor in Miss CUMMINGS' "The lichens of Alaska," though she determined Miss COOLEY's plants, yet in the Herbarium of the New York Botanic Gardens there are two sterile examples labelled *vulpina* in Miss CUMMINGS' handwriting, on a "Flora of Alaska" label "collected by Miss GRACE E. COOLEY." Although Miss COOLEY did not include the species in her list at all (from either Alaska or B.C.), yet it is most probable that the above specimens came from the latter place. Eastward this plant extends to Montana (*Rydberg*, *Vreeland*, *Williams*), Wyoming (*Willey*), Black Hills, South Dakota (*Hayden*), Nebraska (*Fink*), and Grant Co., Nebraska (*Rydberg*), from where I have seen it fertile. It is reported also from Wisconsin or

Minnesota (Parry) by Professor FINK.<sup>6</sup> It is rarely found fruited, however, near the geographical and altitudinal limits of its range.

OBSERVATIONS: This species owing to its vivid color is the most conspicuous of the genus. Though a new generic name (*Chlorea*) was proposed by NYLANDER for this and a few other species, and earlier a title *Letharia* (see WAINIO) by Th. FRIES (later again *Nylanderaria* Kuntze), as before stated there is no good reason for this distinction. A study of the plant shows intergrades approaching *prunastri*, through its variety, in thalline structure (and color), and it is quite evident that morphologically this species differs from *prunastri* less than *furfuracea*, with which *prunastri* has stood since 1825. The robust plant growing in the regions of heavy rainfall in California, Washington, and Oregon (set apart as var. *californica* by NYLANDER, though named already by NUTTALL<sup>7</sup> *columbiana* in 1834, if not by ACHARIUS *xantholina* in 1810), is not in the author's opinion worthy of varietal rank.

Section: ARCHEVERNIA Th. Fr. Lich. Scand. 29. 1871

*Thallus bifacial to subbifacial, medulla cottonous*

EVERNIA PRUNASTRI (L.) Ach.

TYPE: Not indicated; one of the specimens on which LINNAEUS based his species is in the Dillenian herbarium, Botanic Gardens, Oxford, England, and according to CROMBIE is "sterile." According to WAINIO "39 *Lichen prunastri* = *Evernia prunastri* Ach." as represented in the Linnaean herbarium.

TYPE LOCALITY: "Europae."

ORIGINAL DESCRIPTION: "foliaceus erectiusculus lacunosus: subtus tomentosus albus." Linn. Spec. Pl. 2:1147. 1753.

FIGURE: [DILL., Hist. Musc. pl. 21. f. 54 = *E. p.* var. *gracilis* Ach.; 55a = *E. prunastri* (L.) (*soredifera*); c and d = *E. prunastri*, Ach.; h = *E. p.* f. *retusa* Ach. fide CROMBIE].<sup>8</sup>

SYNONYMY: *Lichen prunastri* Linn. *ibid.*; *Evernia prunastri* Ach. Lich. Univ. 442. 1810.

DIAGNOSIS: *Thallus caespitose* or subpendulous, *compressed* (bifacial), *rough*, *sorediate*, virescenti-stramineous.

DESCRIPTION: typical. *Thallus* loosely caespitose, subpendulous or pendulous, mollitinous, compressed, at length expanded, channeled, and paler below; *cortex* rugose-lacunose, more or less sorediate, stramineous to virescent; *primary branches* coarse,

<sup>6</sup> It is recorded from Maine (ECKFELDT, J. W., Flora Mt. Desert, Me., 252. 1894), but the record is very doubtful and needs verification. The record probably refers to the var. *thamnoides*.

<sup>7</sup> Jour. Acad. Nat. Sci. Phila. 7:59. 1834.

<sup>8</sup> Pre-Linnaean references in brackets.

dichotomous, divaricate (max. length 12 cm.); *secondary branches* dichotomous, divaricate, furcate. *Apothecia* lateral, subpedicellate (max. diameter 6 mm.), disk chestnut, emarginate. *Spores* 5-7  $\times$  3.5-4.5  $\mu$ .

CONTINGENT PHASES: (a) more or less completely sorediate (*E. p. soredifera* Ach. Lich. Univ. 443. 1810).

SUBSTRATA: Trees, dead wood, fences, roofs, and occasionally on rocks.

GEOGRAPHICAL DISTRIBUTION: This species is confined in North America to the Pacific coast. I have examined specimens from the San Gabriel Mts., Cal., northward to British Columbia. Its variety is the plant found throughout the rest of our area.

OBSERVATIONS: This lichen with its variety shows a common tendency (see *Usnea*) to vary from virescent on the Atlantic coast to stramineous on the Pacific. Specimens from the southwest have an inclination to expand their laciniae and to become channeled below, suggesting *furfuracea*. The apices are also more truncate and furcate; in fact the plants are comparable with the temperate European specimens which represent true *prunastri*; but both in Europe and throughout our area intergradation is shown, diverging types of laciniae occurring rarely in a single plant. Specimens from east of the Rocky Mountains and from Alaska are of the linear type, and were referred by WILLEY to *E. thamnodes* Nyl.<sup>9</sup> To settle upon the rightful name for this linear plant is most perplexing. It appears, however, as follows: The oldest traceable name that has been used is *arenaria* Retz., but the type of *Lichen arenarius* Retz.<sup>10</sup> has been kindly sent me by Professor OTTO R. HOLMBERG of Lund, and proves to be *Evernia divaricata* (L.) Ach. as cited by ACHARIUS, and not as by FRIES and NYLANDER as a variety under *E. prunastri*. The next possible cognomen used was given by ACHARIUS  $\gamma$  *gracilis* (*l.c.* 442), with the locality "Sveciac." In his herbarium, however, WAINIO<sup>11</sup> cites two specimens, one from "Helvetia" and one from "Kamtschatka." The former he says has "lacinii laevissimis" and seems a young form of *prunastri*, to which, he writes, ACHARIUS' second description (*Obs.*) without doubt refers. The latter specimen he says intermixed with it is *E. mesomorpha* Nyl. In the Acharian herbarium today (*fide* ELFVING) only the Kamtschatka specimens exist. Seeing therefore that ACHARIUS in his original description used the words "lacinii laevissimis"; that the Swedish plant has not been found in the herbarium; and that the one specimen, apparently lost, was "laevissimis," a character in no way fitting our variety, we must pass on to the next available name. This we find was given by FLOTOW (*l.c.*) in a very

<sup>9</sup> FLOTOW, Lich. Schles. no. 54 c. 1829; and KOERBER, Syst. Lich. Germ. 42. 1855.

<sup>10</sup> Fl. Scand. Ed. 2. 292. 1795.

<sup>11</sup> Meddel. Soc. Faun. et Fl. 8:117. 1881.

rare text accompanying his exsiccati which I have been unable to see, but is later cited by KOERBER as a trinomial: *Evernia prunastri*  $\beta$  *thamnodes* Flot. KOERBER curiously enough makes it synonymous with *Physcia divaricata*  $\beta$  *arenaria* Schaerer, showing the cycle of error caused by the RETZIUS specimen. HUE has used this name for our plant in the combination *Letharia thamnodes* (l.c. 58). NYLANDER described *E. mesomorpha* (Lich. Scand. 74. 1861), a name now generally considered synonymous; and again in the last year G. K. MERRILL distributed the plant as *Evernia prunastri* form *mollis* Merrill (Lich. exs. no. 51). It is very unlikely that the var. *vulgaris* Koerber (l.c.) is a synonym of *thamnodes*, but it seems quite plain that *gracilis* Ach. and *stictoceras* Sowerby are synonymous and do not refer to this plant; and it is not improbable that *E. mesomorpha* f. *esorediosa* Nyl. (Lich. Japan. 25. 1890) belongs with these.

#### EVERNIA PRUNASTRI var. THAMNODES Flot.

TYPE: No. 54c FLOTOW, Lich. vorzüglich in Schlesien 1:1829.

TYPE LOCALITY: "Sveciae."

ORIGINAL DESCRIPTION: "Thallus utrinque concolor laciniis longioribus angustioribus implexis verrucoso-furfuraceis" (KOERBER); and "Fruticulosa, undique corticata, similis verrucoso-furfuracea" (WENDT, Thermen zu Warmbrunn, 94. 1840).

FIGURE: HOWE, Common and Conspicuous Lich. N.E. pt. 1. 24. 1906. FINK, Lich. Minn. Cont. U.S. Nat. Herb. 14: pl. 39. 1910.

SYNONYMY: *Evernia prunastri*  $\beta$  *thamnodes* Flot., KOERBER, Syst. Lich. Germ. 42. 1855.

DIAGNOSIS: *Thallus* prostrate, *subterete* (subradial), rough, *virescent*.

DESCRIPTION: typical. *Thallus* caespitose, prostrate, *subterete*; *cortex* rugose, rarely *sorediate*, *virescent*; apices of branches *acuminate*; otherwise as in last.

SUBSTRATA: Same as last.

GEOGRAPHICAL DISTRIBUTION: Found throughout the Transition and lower Boreal zone. It is reported from Newfoundland (*Eckfeldt*) and from Manitoba (*Macoun*) and Vermillion Lake, Ontario (*Arthur*, etc.). It becomes rare, however, in northern Maine and Oregon, and is not reported from Labrador. RICHARDSON collected it, however, in Arctic America, Ft. Franklin, Great Bear Lake (1836), and I have examined several fertile specimens collected on *Betula* at Dawson, Yukon, Canada, by Mr. R. S. WILLIAMS early in the spring of 1899. HUE records *E. thamnodes* (Flot.) Nyl. from Port Clarence, Alaska, the White Mts., and "Ottawa." Southward it extends to the border of the upper Austral zone. I have seen specimens from New York (*Harris*, *Blake*), Fayette, Iowa, Minnesota, Ohio, and Nebraska (*Fink*). SWARTZ recorded it (?) from the West Indies (1791).



It is this variety that has been commonly distributed as *Evernia prunastri* in most of the North American exsiccati.

### EVERNIA DIVARICATA (L.) Ach.

TYPE: Not indicated; the specimen on which LINNAEUS based his species is in the Dillenian herbarium, Botanic Gardens, Oxford, England, and "is represented . . . by only two or three sterile laciniae" according to CROMBIE. According to WAINIO, "*Lichen divaricatus* = *Evernia divaricata* Ach.," as represented in the Linnaean herbarium.

TYPE LOCALITY: "Helvetiae."

ORIGINAL DESCRIPTION: "filamentosus pendulus angulatus articulatus intus tomentosus, ramis divaricatis, peltis orbiculatis sessilibus." Linn. Syst. Nat. 713. 1767.

FIGURE: [DILL., Hist. Musc. *pl.* 12. *f.* 5. 1741]. HOFFM., Descript. et adnum. Lich. *pl.* 67. *f.* 1, 2, 3. 1801.

SYNONYMY: *Lichen divaricatus* Linn. Syst. Nat. *ibid.*; *Evernia divaricata* Ach. Lich. Univ. 441. 1810.

DIAGNOSIS: *Thallus* pendulous, *flaccid*, *compressed* (subbifacial), glabrous, stramineous.

DESCRIPTION: typical. *Thallus* pendulous, flaccid, subterete, compressed or angulate; cortex glabrous rugose and annularly ruptured, exposing cottonous medulla, stramineous; *primary branches* divaricate, dichotomous, sometimes echinate (max. length 35 cm.); *secondary branches* dichotomous, apices acuminate and darkening. *Apothecia* uncommon, lateral, small (max. diameter 2-6 cm.), marginate, thalline exciple rugose, disk chestnut, margins finally crenulate. *Spores* 5-10 × 3.5-6  $\mu$ .

CONTINGENT PHASES: unobserved.

SUBSTRATA: On coniferous trees.

GEOGRAPHICAL DISTRIBUTION: Occurs rarely in the Boreal zone. It has been reported from the following localities in the Rocky Mountains: California (*Hall*), Colorado (*Brandegee*), Bamff (*Macoun*), Mt. For-get-me-not, Elbow River (*Macoun*), British Columbia (*Macoun*). I have seen specimens from Divide Mt., 8000 ft., Montana (*Williams*), and Alpine, Colorado. The specimen in the U.S. Nat. Herbarium from Colorado, collected by Professor G. VASEY (referred to by TUCKERMAN), is unquestionably *Usnea cavernosa* Tuck. I have seen no fertile specimens from our area.

OBSERVATIONS: This plant is so rare in North American collections that its exact range is little known. It is undoubtedly a Boreal species, and may be looked for throughout the Rocky Mountains above 7000 ft. Its extreme flaccidity, and more or less compressed thallus, distinguishes it from *Usnea*,

which it in some degree suggests, on account of its annularly scarred thallus. The soft, cottonous, compressed medulla is at once seen, however, to be very unlike the terete, chondroid cord of *Usnea*. Like *thamnodes*, this species and *vulpina* have what has been considered a radial thallus. The structure cannot be said, however, to be strictly radial, and intergrades both individually and in species relation.

### EVERNIA FURFURACEA (L.) Mann.

TYPE: Not indicated; the specimen on which LINNAEUS based his species is not in the Dillenian herbarium, Botanic Gardens, Oxford, England, "but two specimens which are there are smaller and sterile, though sufficiently typical" according to CROMBIE. According to WAINIO "*33 Lichen furfuraceus* = *Evernia furfuracea* Mann.," as represented in the Linnaean herbarium.

TYPICAL LOCALITY: "Europae."

ORIGINAL DESCRIPTION: "foliaceus decumbens furfuraceus: laciniis acutis: subtus lacunosus atris," Linn. Spec. Pl. 2:1146. 1753.

FIGURE: [DILL., Hist. Musc. pl. 21. f. 52. 1741]; HOFFM., Descript. et adnum. Lich. pl. 9. f. 2. 1790.

SYNONYMY: *Lichen furfuraceus* Linn. *ibid.*; *Evernia furfuracea* Mann. Lich. in Boh. obs. despos. suc. des. 105. 1825.

DIAGNOSIS: *Thallus* caespitose or subpendulous, compressed (bifacial!) and *channeled*, *furfuraceous-isidioid*, *cinereous*.

DESCRIPTION: typical. *Thallus* prostrate, caespitose, or subpendulous, compressed, pliant, *channeled* below; cortex above furfuraceous to isidioid, below lacunose; above cinereous, below white, at length blackening; *primary branches* dichotomous, sub-pinnate (max. length 15 cm.); *secondary branches* much divided, apices furcate or tripartate. *Apothecia* marginal, subpedicellate, ample (max. diameter 1.7 cm.), disk chestnut. *Spores* 5.5–8 × 3.5–5  $\mu$ .

CONTINGENT PHASES: reduced, sterile (boreal swamps in Transition regions).

SUBSTRATA: Coniferous and deciduous trees.

GEOGRAPHICAL DISTRIBUTION: Found throughout the Transition zone as far south as Bergen, New Jersey (*Eckfeldt*); Albany, New York; Pike Co., Penn.; Ohio (*Bogue*); Walker Mts., Smyth Co., Virginia; Grandfather (*Cummings*) and Crowden Mts., N.C.; Florida (*Calkins*); Tennessee (*Moore*); and Orizaba Mt., Mexico (*Stone*). Westward it extends to Minnesota (*Fink*). It reaches northward only to the lower limits of the Boreal zone, practically all alpine (over 3000 ft.) examples being referable to the following variety.

OBSERVATIONS: This species is found to intergrade with its variety where they meet on the mountain sides of the southern peaks; intermediate and atypical specimens having been examined from Grandfather Mt., S.C.; at Coahuila, and on Orizaba Mt., Mexico. Fertile examples of the species are rare, and the apothecia always smaller than in the variety.

EVERNIA FURFURACEA var. CERATEA (Ach.) Nyl.

TYPE: Not indicated; but the specimens on which the species was based are in the Acharian herbarium, Universitets Botaniska Institution, Helsingfors. These specimens have been kindly sent me for examination by Dr. FRED. ELFVING. The two labelled "var. *ceratea*" are typical fruited specimens, showing the characteristic "corniculato ramosis," and nearly smooth thallus. The specimens of the varieties  $\beta$  *nuda* and  $\delta$  *scobisina* (see figure) were formerly indicated on the mounts by \* and †, but these marks were either erased by ACHARIUS or some later worker, so that the exact identification of the (sterile) specimens referred to is in doubt. In any event, the specimens are referable to the species *furfuracea* rather than to the corniculate variety. The variety  $\gamma$  *scobisina* is indistinguishable from the species, being only a name for a more isidioid contingent phase, while *nuda* was not recognized in the *Methodus* (1803) as were the other varieties, but was first described in 1810. *Nuda* represents a contingent phase of *furfuracea* unworthy of recognition, transitional at best, though curiously enough the only one retained by Acharius in the *Synopsis* of 1814.

TYPE LOCALITY: Not indicated, but the above specimens are labelled "Svecia."

ORIGINAL DESCRIPTION: "thalli laciniis angustioribus suberectus corniculato-ramosis acuminatis supra incanis glabris nudiusculis."

FIGURE: none.

SYNONYMY: *Parmelia furfuracea*  $\beta$  *ceratea* Ach. Method. Lich. 2:255. 1803; *Evernia furfuracea* var. *ceratea* (Ach.) Nyl. Lich. Scand. 73. 1861.

DIAGNOSIS: Similar to last, *glabrous*, branches *subcylindrical* near apices, apothecia *ample*.

DESCRIPTION: typical; similar to last. *Thallus* more *gross*; cortex *glabrous* above, sometimes *verrucoso-papillate*, *rugose* or *pitted*, black *spermogones* frequent, branches distally *subcylindrical*, often linear. *Apothecia* common, at length crowded, *ample* (max. diameter 1.8 cm.). *Spores* as in last.

CONTINGENT PHASES: reduced branches with apices alike on both sides, entangled (*E. furfuracea* var. *Cladonia* Tuck.).

GEOGRAPHICAL DISTRIBUTION: Confined to alpine regions of the Boreal zone at altitudes of over 3000 ft. It occurs on the Appalachian range: in New Hampshire on the White Mts.; in Vermont I have seen it only from Mt.

Ascutney; in New York it is reported from Panther Mt., Catskills (*Harris*), and Mt. Whiteface, Adirondacks (*Peck*); and some of the material distributed from Grandfather Mt., N.C., by Miss CUMMINGS (Decades N. Amer. Lich. No. 2) is referable here. It undoubtedly occurs on Mt. Katadin, Me., and I have seen specimens from Ontario, Canada. The plants from the eastern United States are nearly always sterile or show rarely minute apothecia, entirely smooth and more "thyrsoid-entangled," and may possibly be worth recognition under the var. *Cladonia*<sup>12</sup> of TUCKERMAN, though they are in reality probably only reduced conditions of the more alpine fertile plant. In the Rocky Mountains I have seen specimens from alpine regions reaching 10,200 feet, extending from Colorado (Lake Moraine, Pikes Peak; Pagosa Peak, Veta Pass), New Mexico (Socorro Co., Mt. Gray), Arizona, Texas (*Parry*), southern California to Mexico (Coahuila, Monterey, San Luis Potosi,<sup>13</sup> Mt. Orizaba).

OBSERVATIONS: This plant in its fruited condition, as already noted, strongly suggests morphologically the var. *vittata* Ach. of *Parmelia physodes*. It is also interesting to note that TUCKERMAN<sup>14</sup> first considered the examples referable to his *Cladonia* nearest to ACHARIUS' *ceratea*.

#### Section: EUEVERNIA sect. nova.

*Thallus bifacial, medulla stuppeous, compressed, non-chondroid*

#### EVERNIA TRULLA (Ach.) Mont.

TYPE: Is in the Acharian herbarium, Universitets Botaniska Institution, Helsingfors, according to Professor FRED. ELFVING in litt. May 8, 1910.

TYPE LOCALITY: Peru, South America.

ORIGINAL DESCRIPTION: "thallo membranaceo subcaespitosa albido-pallescenti utriusque nudo glabro subtus canaliculato, laciniis linearibus dichotomis; scutellis marginalibus cyathiformibus rufo-fuscis, margine subtusque crenulato-rugosis."

FIGURE: Method. Lich. *pl.* 4. f. 6. 1803.

SYNONYMY: *Parmelia trulla* Ach. Meth. Lich. 256. 1803; *Evernia trulla* Mont. C. Gay, Fl. Chil. 8:74. 1852.

DIAGNOSIS: *Thallus* caespitose decumbent, *compressed* (bifacial), glabrous, canaliculate, pale virescent.

DESCRIPTION: typical. *Thallus* caespitose, decumbent, compressed, canaliculate; cortex glabrous, glauco-virescent, darkening

<sup>12</sup> Synop. Lich. N. E., etc. 12. 1848. Type: No. 56, Fasc. 3, 4, Lich. Amer. Sept. exsiccati, 1854. Type locality: "Montium Alborum."

<sup>13</sup> Material from here showed a few rhizinae.

<sup>14</sup> Further enum. N. E. Lich. Bost. Jour. Nat. Hist. 3:300. 1840.

beneath; *branches* dichotomous. *Apothecia* lateral, subcyathiform, exciple rugose, disk chestnut-brown. *Spores*  $11-16 \times 7-9 \mu$ .

SUBSTRATA: On the ground.

GEOGRAPHICAL DISTRIBUTION: Mexico.

OBSERVATIONS: This rare North American plant has been only recorded from Mexico. It seems in every way logical that this species should therefore stand last of the *Evernias*, and next before the *Parmeliaceae* in our taxonomy. This relation has been assigned this genus by ZAHLBRUCKNER, with the removal of *Cetraria* into the *Parmeliaceae*, where it occupies a position preceding *Evernia*.

HUE records *Evernia intensa* Nyl.<sup>15</sup> from Mexico. The species is apparently a chemical one, of which there is probably but little material. I have been unable to see the plant.

In closing this paper it is a great satisfaction to learn that at the Congress at Brussels *Linnaeus Species Plantarum* (1753) has been approved as the starting point for lichenological nomenclature. The labor involved here and in my *Usnea* paper in settling the priority of names is therefore not in vain.

For the opportunity to complete this paper I am indebted largely to Dr. N. L. BRITTON, who extended me during the past year a Garden Research scholarship, which was unfortunately cut short by ill health. To many others connected with the New York Botanic Gardens, to Dr. G. C. ALLEN, Dr. L. W. RIDDLE, Dr. FRED. ELFVING, Prof. BRUCE FINK, Dr. H. E. HASSE, Dr. R. W. DRECHSLER, Mr. L. K. LUNT, and numerous other friends I am also most grateful.

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#### EXPLANATION OF PLATES XXIV AND XXV

FIG. 1.—DILLENUS plate of *Evernia prunastri* (L.) Ach. (Lichenoides).

FIG. 2.—DILLENUS plate of *Evernia divaricata* (L.) Ach. (Lichenoides).

FIG. 3.—RETZIUS type of *Lichen arenarius* = *Evernia divaricata*.

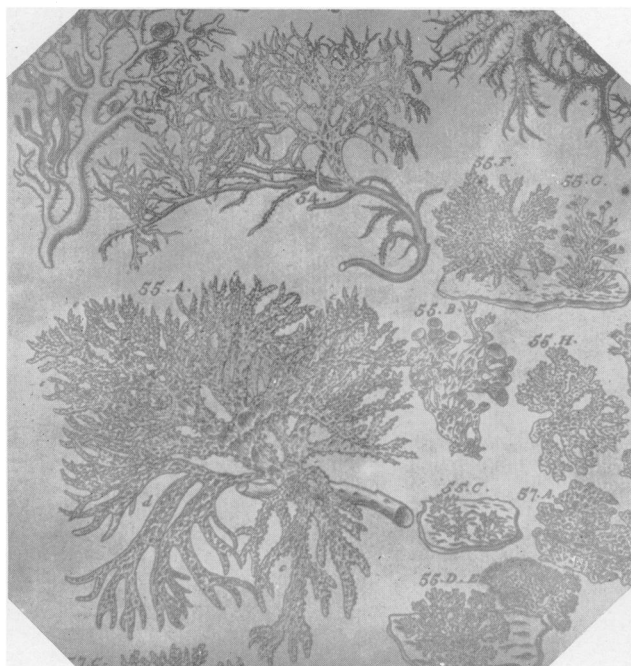
FIG. 4.—DILLENUS plate of *Evernia furfuracea* (L.) Mann. (Lichenoides).

FIG. 5.—*Evernia Trulla* (Ach.) Mont. from a specimen in the U.S. Nat. Herb.

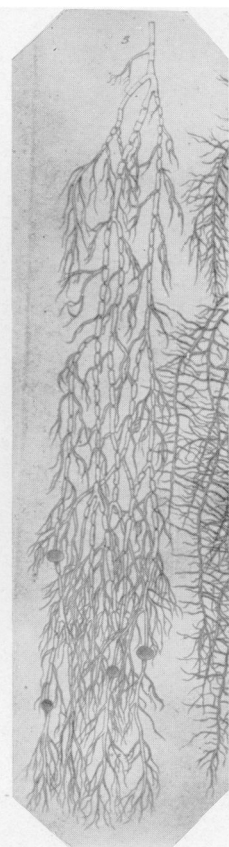
FIG. 6.—Acharian types of *Evernia furfuracea* and varieties (Borrera).

FIG. 7.—*Evernia furfuracea* var. *ceratea* (Ach.) Nyl. collected in Colorado by L. K. LUNT.

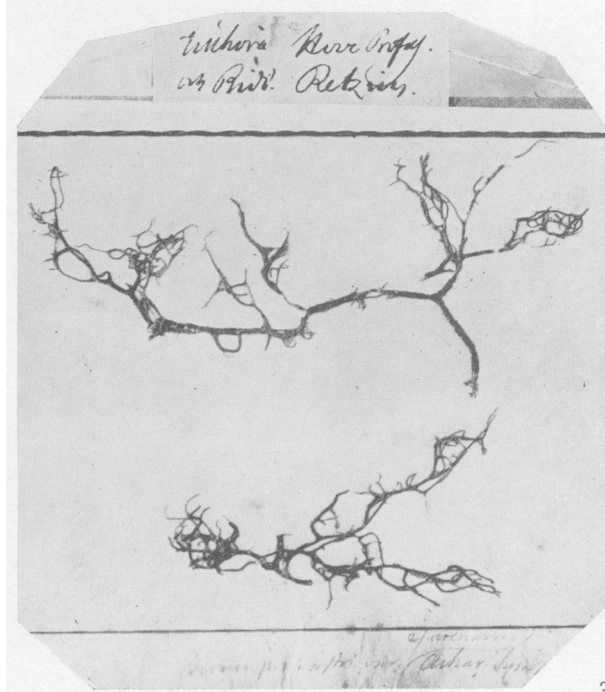
<sup>15</sup> Flora 30:546. 1872; and Bull. Soc. Linn. Norm. 6:269. 1872.



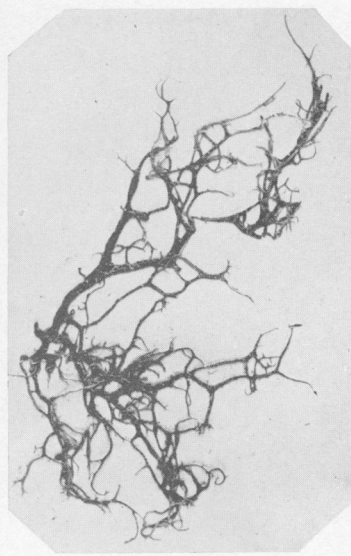
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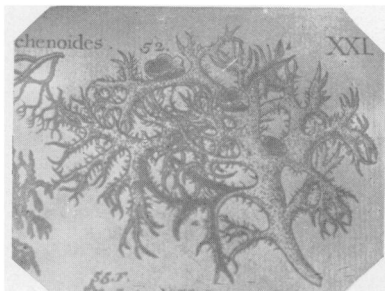


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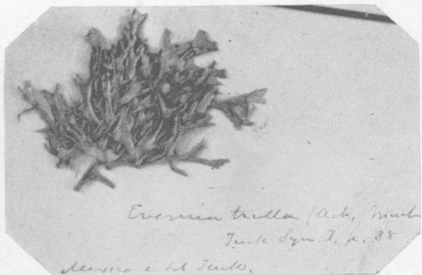


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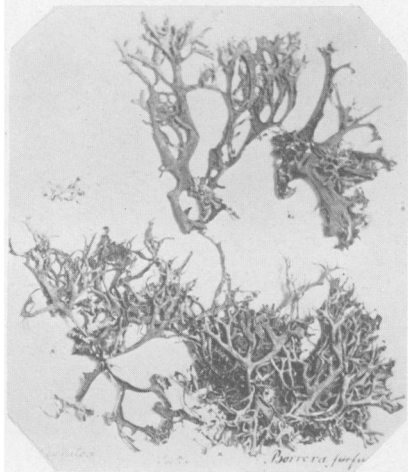




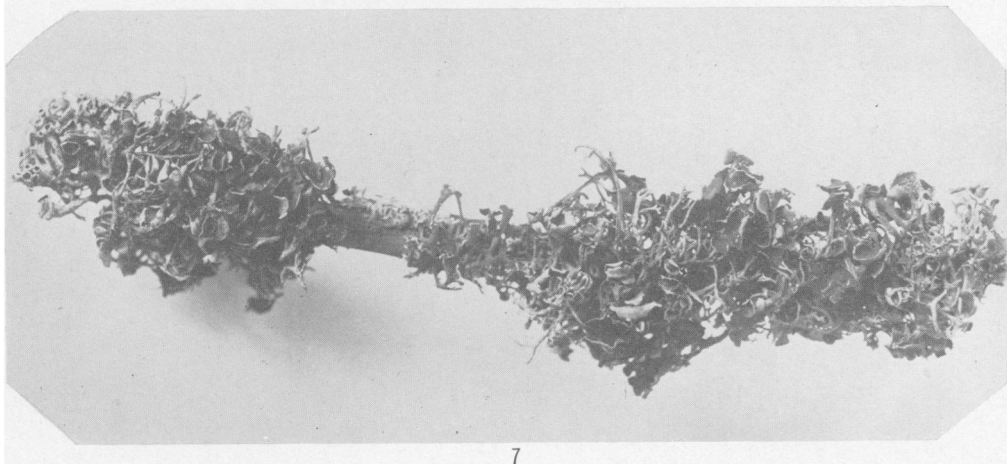
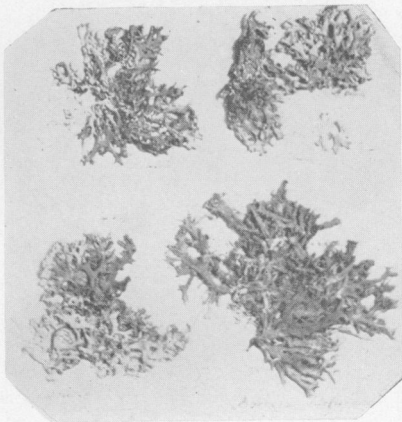
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6



7

HOWE on EVERNIA